

## CLAIMS

What is claimed is:

1. A fastener assembly comprising:

a nut having a generally cylindrical body;

a base and a transition portion coupling the base to the body, the nut having a bore, the base having a base minimum thickness, and the transition portion having a transition minimum thickness greater than or equal to the minimum base thickness; and

a member operably allowing some movement of the nut associated therewith but limiting the movement of the nut.

2. A cage nut assembly comprising:

a nut having a body, a depending base and a transition portion coupling the base to the body, the body and base defining a bore, the body having a body minimum thickness, and the transition portion having a transition minimum thickness greater than or equal to the body minimum thickness; and

a cage disposed about at least a portion of said nut, wherein the cage provides a limited range of movement of the nut within the cage and defines an aperture at least partially aligned with the bore.

3. An automotive vehicle assembly comprising:
  - an automotive vehicle component;
  - a nut having a body and depending base and a transition portion coupling the base to the body, the body and base defining a bore through the body and base, the base having a base minimum thickness the body having a body minimum thickness, the transition portion having a minimum thickness greater than or equal to the body minimum thickness and greater than or equal to the base minimum thickness; and
  - a cage disposed about at least a portion of said nut, wherein the cage provides a limited range of movement of the nut within the cage, the cage being attached to the component.
4. The automotive vehicle assembly in accordance with Claim 3 wherein the nut is a class 10 fastener.
5. The automotive vehicle assembly in accordance with Claim 3 wherein the nut is a medium carbon steel.
6. The automotive vehicle assembly in accordance with Claim 3 wherein the body comprises a planar base and wherein the cage defines a pair of flanges which covers at least a portion of the base.

7. The automotive vehicle assembly in accordance with Claim 3 wherein the body has an exterior surface which is generally cylindrical in shape, the exterior cylindrical surface mates with an upper surface of the base, the interface of the exterior cylindrical surface and the upper surface is a defined concave radius; and wherein the nut defines a through bore, said through bore having a threaded region and at least one countersink.

8. The automotive vehicle assembly in accordance with Claim 3 wherein the body has an exterior surface which is generally cylindrical in shape, the exterior cylindrical surface mates with an upper surface of the base, the interface of the exterior cylindrical surface and the upper surface is a defined concave radius; and wherein the nut defines a through bore, said through bore having a threaded region and at least one countersink.

9. The automotive vehicle assembly in accordance with Claim 3 wherein the wall minimum thickness of the base, the body and the transition portion are substantially constant throughout.

10. A fastener comprising:

a one piece nut having a body and depending base, and a transition portion which couples the body and the base, the depending base having a base minimum thickness, the body and base defining a bore; and

wherein the minimum wall thickness of the transition portion is greater than the minimum thickness of the base.

11. The fastener of Claim 10 further comprising a cage having an upper surface and two pair of flanges bent to enclose at least a portion of the base.

12. The fastener of Claim 10 wherein the base is disposed on the upper surface of the cage.

13. The fastener of Claim 10 wherein the bore comprises a convex countersink surface.

14. The fastener of Claim 10 wherein the bore comprises a flat countersink surface.

15. The fastener of Claim 10 wherein the nut has a proof load of at least 100 mega-pascal.

16. A fastener comprising:
  - a nut having a body;
  - a transversely extending base; and
  - a transition portion, the body and base defining a bore therethrough, wherein a wall minimum thickness of the transition portion is greater than or equal to a minimum thickness of the base and greater than or equal to the minimum thickness of the body.
17. A fastener comprising:
  - a nut having a body and depending base and transition portion, the body and base defining a bore, wherein a minimum wall thickness of the transition portion is greater than a minimum thickness of the body.
18. The fastener of Claim 17 further comprising a cage having an upper surface and two pair of flanges bent to enclose at least a portion of the base.
19. The fastener of Claim 18 wherein the base is disposed on the upper surface of the cage.
20. The fastener of Claim 17 wherein the bore comprises a convex countersink surface.

21. The fastener of Claim 17 wherein the bore comprises a flat countersink surface.

22. The fastener of Claim 17 wherein the body is a cylinder.

23. The fastener of Claim 22 wherein the cylinder is tapered cylinder.

24. A fastener for coupling to an automotive body, said body defining a hole having a first diameter, the fastener comprising:

a body defining a threaded bore therethrough, said threaded bore having a flat countersink having a first outer diameter which is greater than or equal to the first diameter, the flat countersink being configured to guide threaded fasteners into the threaded bore.

25. The fastener of Claim 24 further comprising a member for regulating the movement of the fastener with respect to the hole.

26. The fastener of Claim 25 wherein the member for regulating movement of the fastener is a cage having an upper surface and a pair of flanges configured to enclose at least a portion of said body.

27. The fastener of Claim 25 wherein the member for regulating movement of the fastener is defined on the automotive component.

28. The fastener of Claim 25 wherein the body is a class 10 fastener.

29. The cage fastener of Claim 25 wherein the body comprises a planar base and wherein the means for regulating movement of the fastener covers at least a portion of the base.

30. The cage fastener of Claim 24 wherein the body has an exterior surface which is generally cylindrical in shape, the exterior cylindrical surface mates with an upper surface of the base, and the interface of the exterior cylindrical surface and the upper surface is a defined concave radius.

31. The cage fastener of Claim 30 wherein the bore comprises a flat countersink surface.

32. The cage fastener of Claim 30 wherein the body is formed by a hot forming process.

33. The cage fastener of Claim 30 wherein the body is formed by a cold forming processes.

34. The cage fastener of Claim 30 wherein the body is heat treated.

35. The cage fastener of Claim 30 wherein the wall thickness of the body is substantially constant throughout.

36. A fastener construction for coupling a fastener to component, said component defining a hole having a first diameter, the fastener construction comprising:

a body defining a threaded bore therethrough, said threaded bore having a having a second radius and countersink having a first outer radius smaller than or equal to the first diameter, the countersink being configured to guide threaded fasteners into the threaded bore;

a depending base and a transition portion coupling the base to the body, the base defining a bore coaxial to the threaded bore, the base having a base minimum thickness and the body having a body minimum thickness, the transition portion having a transition minimum thickness greater than or equal to the body minimum thickness and the base minimum thickness;

a fastener disposed through the hole and within a portion of the threaded bore; and

a means for regulating the movement of the body with respect to the hole.

37. The fastener construction of Claim 36, further comprising a member which regulates the movement of the depending base with respect to the hole.



38. The fastener construction of Claim 36 wherein the member has an upper surface and a pair of flanges configured to enclose at least a portion of said body.

39. The fastener construction of Claim 36, wherein the member is defined on the component.

40. The fastener construction of Claim 36, wherein the body is converted to a Class 10 fastener by hot forming operations.

41. The fastener construction of Claim 36 wherein the base is planar and wherein the member covers at least a portion of the base.

42. The fastener construction of Claim 36 wherein the body has an exterior surface which is generally cylindrical in shape, the exterior cylindrical surface mates with an upper surface of the base, and counter bore is a defined convex radius.

43. The fastener construction of Claim 36 wherein the bore comprises a flat countersink surface.

44. The fastener construction of Claim 36 wherein the body is formed by a hot forming process.

45. The fastener construction of Claim 36 wherein the body is formed by a cold forming processes.

46. The fastener construction of Claim 36 wherein the body is heat treated.

47. The fastener construction of Claim 36 wherein the minimum wall thickness of the body is substantially constant throughout.

48. A method of forming a fastener comprising:  
hot forming a nut having a cylindrical body with an integral base, further forming a transition portion between the base and the body, the transition portion having a thickness which is greater than a thickness of the body; and  
forming a cage about the nut.